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EXAMINER	
WOLDEMARIAM, AKILILU K	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/568,268	BALSLEV ET AL.	
	Examiner	Art Unit	
	AKLILU k. WOLDEMARIAM	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/05/2007, 06/23/2006*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 02/05/2007 was noted. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 1, line 1, claim limitation, " classification and/or localization of three dimensional objects" does not have three separates embodiments to enable the claim limitation as described in original specification, *[see paragraph [0012] line 2, image recognition and/or localization of an object] and paragraph [0095] for classifying and/or locating bounded 3D objects belonging to distinct classes].* Claim 20, lines 1-2, claim limitation " localizing and/or classifying a three dimensional object" does not have three separates embodiments to enable the claim limitation as described in original specification, *[see paragraph [0012] line 2, image recognition and/or localization of an*

object] and paragraph [0095] for classifying and/or locating bounded 3D objects belonging to distinct classes]. Claims 19 and 32, the claim limitation, *"<u>and/or circular segments</u>, being segments of the contour having constant curvature"* does not have three separates embodiments to enable the claim limitation.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Regarding claim 1 the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d). Claims 2-19 depend on an independent claim 1. Claims 2-19 are also indefinite.

6. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 1-36 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. The Federal Circuit[1], relying upon Supreme Court precedent[2], has indicated that a statutory "process" under 35 U.S.C. 101 must (1) be tied to a particular machine or apparatus, or (2) transform a particular article to a different state or thing. This is referred to as the "machine or transformation test", whereby the recitation of a particular machine or transformation of an article must impose meaningful limits on the claim's scope to impart patent-eligibility (See *Benson*,

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[1] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

[2] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

409 U.S. at 71-72), and the involvement of the machine or transformation in the claimed process must not merely be insignificant extra-solution activity (See *Flook*, 437 U.S. at 590”). While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform an article nor are positively tied to a particular machine that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. *Machine test Analysis , in claims 1 and 20 in the steps “ identifying features”, “extracting numerical”, “generating the gradients” and “generating contours” do not have any “computer " or “ processor” or “ device” to carry out all the steps of in claims 1 and 20. It is clear that claims are not tied to a particular machine and claims 1 and 20 are failed to pass the machine test analysis. And also claims do not have (a) physical or chemical transformation of a physical object, (b) no modification to data or signal; (c) claims 1 and 20 do not have either displaying or printing any where in claim ; (d) Modification and /or transformation not meaningful or insignificant. Therefore claims 1 and 20 require computers or processors or device after the word "comprising".*

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minsky, D.E. et al., (Optimal boundary detection on grey-tone image, Pattern recognition, vol.30, No.6, pp. 971-998, 1997 from IDS) in view Candocia, Frank M.,

(Simultaneous Homographic and Comparametric Alignment of Multiple Exposure-Adjusted Pictures of the Same Scene, IEEE Transactions on Image Processing, Vol. 12, No. 12, December 2003, pp. 1485-1494, from IDS).

Regarding claim 1,*Minsky discloses [claims examined as best understood by examiner],* a method for recognition, such as classification and/or localization of three dimensional objects, said one or more objects being imaged so as to provide a recognition image being a two dimensional digital image of the object, said method utilizes a database in which numerical descriptors are stored for a number of training images, the numerical descriptors are the intrinsic and extrinsic properties of a feature *(page 971, col.2, pixel classification and page 7972, col.1, lines 1-16)* said method comprising:

identifying features (*see page 972, col.1, classification feature and col.2, finding a boundary in feature space all referred to identifying features),* being predefined sets of primitives, for the image extracting numerical descriptors *(page 972, col.2, // 12-15 pre-defined points and page 973, col.2, description of a pixel location by vector referred all to numerical descriptors)* of the features, said numerical descriptors being of the two kind (see page 972, col.2, // 12-15, pre-defined points, lines 25-47 extracting, finding a boundary in the feature):

extrinsic properties of the feature, such as the location and orientation of the feature in the image *(see page 973, col.2, an image surface and define a co-ordinate system O(x,y) for description of a pixel location by vector z=(x,y) and co-ordinate system referred to location and orientation feature of an image).*

Minsky does not disclose intrinsic properties of the feature derived after a homographic transformation being applied to the feature matching said properties with those stored in the database and in case a match is found assign the object corresponding to the properties matched in the database to be similar to the object of the object to be recognized.

However, Frank discloses intrinsic properties of the feature (after applied homographic) *(see page 1486, col.2, scaling and rotation all referred to intrinsic properties and page 1490, estimated intrinsic parameter)* derived after a homographic transformation being applied to the feature matching said properties with those stored in the database *(see page 1486, col.1, the second and actual model relating the domain transformation between images presented is the homographic model and page 1487, col.2, the homographic transformation of (1) tonally by the comparametric relation of (3) to a good accuracy and page 1489, col.1, parameters are sets to the identify transformation, i.e., the range parameter k=1 and the domain model)* and in case a match is found assign the object corresponding to the properties matched in the database to be similar to the object of the object to be recognized *(see fig.2 and 3, compare sequence of images and compare referred to match).*

It would have been obvious to ordinary skill in the art when the invention was made to use Frank's intrinsic properties of the feature derived after a homographic transformation being applied to the feature matching said properties with those stored in the database in Frank’s a method for recognition, such as classification and/or localization of three dimensional objects, said one or more objects being imaged so as

to provide a recognition image being a two dimensional digital image of the object, said method utilizes a database in which numerical descriptors are stored for a number of training images, the numerical descriptors are the intrinsic and extrinsic properties of a feature because it will to obtain accurate transformation between images such as translational, rotational, affine or homographic mapping, *[Frank, page 1485, col.1].*

Regarding claim 2, *Frank discloses* a method according to claim 1, for matching a recognition image with training images stored in a database, wherein the matching comprising the following steps:

for each training image *(see page 1486, col.1, model relating the domain transformation between image presented is the homographic and model referred to training);*

determining the values of roll, tilt and pan of the transformations bringing the features of the recognition image to be identical with the features of the training image *(see page 1486, col.1, the two models are utilized, the first consists of a translation and rotation model that is used in the initial stages of the registration and the second and actual model relating the domain transformation between images presented is the homographic);*

identify clusters in the parameter space defined by the values of roll, tilt and pan determined by said transformations and identify clusters having predefined intensity as corresponding to an object type and localization *(see page 1486, col.1, the domain of an image function to those of other images by a homographic mapping. This model is*

know to describe the relation between perspective views captured a pinhole camera that is allowed to pan, tilt, rotate and/or zoom about its optical center).

Regarding claim 3, *Frank discloses* a method according to claim 1, wherein the database comprise for each image one or more records each representing a feature with its intrinsic *(see page 1486, col.1, the second and actual model relating the domain transformation between images presented is the homographic model and page 1487, col.2, the homographic transformation of (1) tonally by the comparametric relation of (3) to a good accuracy and page 1489, col.1, parameters are sets to the identify transformation, i.e., the range parameter k=1 and the domain model).*

Regarding claim 4, *Frank discloses* a method according to claim 3, wherein the matching comprises the steps of:

resetting the roll, tilt and pan parameter space, for each feature in the recognition image *(see page 1486, col.1, the domain of an image function to those of other images by a homographic mapping. This model is know to describe the relation between perspective views captured a pinhole camera that is allowed to pan, tilt, rotate and/or zoom about its optical center)*,

matching properties of the recognition image with the properties stored in the database, in case of match *(see figs.2 and 3, compare a sequence of images and compare referred to match):*

determining roll, tilt, and pan based on the extrinsic properties from the database and from the recognition image*(see page 1486, col.1, the domain of an image function to those of other images by a homographic mapping. This model is know to describe the*

relation between perspective views captured a pinpole camera that is allowed to pan, tilt, rotate and/or zoom about its optical center),

updating the parameter space, and test for clustering and store coordinates of clusters with sufficiently high density/population with an index of the training image, repeating the steps until all features in the recognition image have been matched *(see page 1486, col.1, the domain of an image function to those of other images by a homographic mapping. This model is know to describe the relation between perspective views captured a pinpole camera that is allowed to pan, tilt, rotate and/or zoom about its optical center).*

Regarding claim 5, *Frank discloses* a method according to claim 4 wherein the determination of the roll, tilt and pan are only done for features having similar or identical intrinsic properties compared to the intrinsic properties in the database *(see page 1486, col.1, the domain of an image function to those of other images by a homographic mapping. This model is know to describe the relation between perspective views captured a pinpole camera that is allowed to pan, tilt, rotate and/or zoom about its optical center).*

Regarding claim 6, *Frank discloses* a method according to claim 4 wherein the matching comprises comparing the intrinsic descriptors of the recognition image with the intrinsic descriptors stored in the database thereby selecting matching features *(see page 1486, col.1, the second and actual model relating the domain transformation between images presented is the homographic model and page 1487, col.2, the homographic transformation of (1) tonally by the comparametric relation of (3) to a*

good accuracy and page 1489, col.1, parameters are sets to the identify transformation, i.e., the range parameter k=1 and the domain model).

Regarding claim 7, *Minsky discloses* a method according to claim 1, wherein the generation of said database comprises determination of contours, preferably level contours, and primitives in a digital image, said determination *(see page 972, col.1, lines 1-15, in this case, the classification task is restricted to the separation of all pixels into two classes only: contour and background (i.e. inner region) elements. In the segmentation task, such a decision is called the "formation of contour preparation")* comprising the steps of:

generating the gradients of the digital image *(see page 972, col.1, lines 5-8, the detection of all the boundaries is equivalent to the detection of all homogeneous regions. Gradient methods can be classified into two categories, i.e. parallel and sequential edge detectors);*

finding one or more local maxima of the absolute gradients *(see fig.3, gradient on optimal level line and gradient on inner lines of objects A and B);*

use the one or more local maxima as seeds for generating contours, the generation of the contours for each seed comprising determining an ordered list of points representing positions in the digital image and belonging to a contour *(see fig.3, gradient on optimal level line and gradient on inner lines of objects A and B);*

for all of said positions determining the curvature, preferably determined as dθ/ds preferably pixel units, of the contours *(see page 972, col.1, lines 1-15, in this case, the classification task is restricted to the separation of all pixels into two classes only:*

contour and background (i.e. inner region) elements. In the segmentation task, such a decision is called the "formation of contour preparation");

from the determined curvatures determine primitives as characteristic points on or segments of the contours *(see page 972, col.1, lines 1-15, in this case, the classification task is restricted to the separation of all pixels into two classes only: contour and background (i.e. inner region) elements. In the segmentation task, such a decision is called the "formation of contour preparation")*

Regarding claim 8, *Minsky discloses* a method according to claim 7 further comprising the step of eliminating potential seed points identified near already defined contours *(see 972, col.1, lines 1-15, in this case, the classification task is restricted to the separation of all pixels into two classes only: contour and background (i.e. inner region) elements. In the segmentation task, such a decision is called the "formation of contour preparation")*.

Regarding claim 9, *Minsky discloses* a method according to claim 7, wherein the generation of the contours comprising assigning the list of points representing positions in the digital image, each point having a value being assigned to be common with the value of the seed *(see page 972, col.1, in this case, for any number of objects, the classification task is restricted to the separation of all pixels into two classes only: contour and background (i.e., inner region) elements. In the segmentation task, such a decision is called the formation of contour preparation).*

Regarding claim 10, *Minsky discloses* a method according to claim 7, wherein the generation of the contours comprising assigning the list of points following in each

point the direction of the maximum or minimal gradient detected perpendicular to a contour direction *(see fig.3, gradient on inner lines of objects A and B and gradient on optimal level line and gradient on contour).*

Regarding claim 11, *Minsky discloses* a method according to claim 7, wherein the generation of the contours comprising assigning the list of points with values being above or below the value of the seed and one or more neighbour pixels with value below or above said value of the seed *(see page 972, col.1, lines 1-15, in this case, the classification task is restricted to the separation of all pixels into two classes only: contour and background (i.e. inner region) elements. In the segmentation task, such a decision is called the "formation of contour preparation").*

Regarding claim 12, *Minsky discloses* a method according to claim 7 wherein the list of pixels is established by moving through the digital image in a predetermined manner *(see page 972, col.2, the graph nodes were edge elements defined by two neighbouring pixels. A boundary was a sequence of adjacent edge elements that started and ended at pre-defined points).*

Regarding claim 13, *Minsky discloses* a method according to claim 8, wherein the contours being determined from an interpolation based on the list of pixels (*see page 972, col.1, between two adjacent pixels I and j, the level of lines are located from V(zi) to V(zj)-1. It is assumed that V(zi) < V(j). If pixels i and j (on the conditions that the interpolation model of the image does not contain hills and valleys between pixels).*

Regarding claim 14, *Minsky discloses* a method according to claim 8, wherein the list is an ordered list of pixels *(see page 972, col.2, the graph nodes were edge elements defined by two neighbouring pixels. A boundary was a sequence of adjacent edge elements that started and ended at pre-defined points).*

Regarding claim 15, *Minsky discloses* a method according to claim 7, wherein the gradients are determined by calculating the difference between numerical values assigned to neighbouring pixels (*see page 972, col.1, the width of the pencil is also equal to the gradient brightness module if the distance between pixels is equal to one).*

Regarding claim 16, *Minsky discloses* a method according to claim 7, wherein the gradients are stored in an array in which each element corresponds to a specific position in the first image and being a numerical value representing the value of the gradient of the first image's tones In the specific position *(see page 1486, col.2, the comparametric relation between the pixel value of two image).*

Regarding claim 17, *Minsky discloses* a method according to claim 7, wherein the curvatures being established as K=dθ/ds where θ is the tangent direction at a point on a contour and s is the arc length measured from a reference point *(see page 972, col.2, not only brightness information but also geometrical (curve, curvature, length, smoothness etc) and even some global information about the boundary being detected and it is necessary to find a boundary in the feature space as well as its mapping onto the image surface as a single closed contour line).*

Regarding claim 18, *Minsky discloses* a method according to claim 7, wherein the primitives comprise of one or more of the following characteristics:

segments of straight lines, segments of relatively large radius circles, inflection points, points of maximum numerical value of the curvature, said points being preferably assigned to be comers, points separating portions of very low and very high numerical value of the curvature, and small area entities enclosed by a contour *(see page 972, col.2, not only brightness information but also geometrical (curve, curvature, length, smoothness etc) and even some global information about the boundary being detected and it is necessary to find a boundary in the feature space as well as its mapping onto the image surface as a single closed contour line).*

Regarding claim 19, *Minsky discloses* a method according to claim 7, wherein each contour is searched for one or more of the following primitives:

inflection point, being a region of or a point on the contour having values of the absolute value of the curvature being higher than a predefined level *(see page 972, col.1, given the initial point on a curve being tracked, a curve following algorithm examines a neighbourhood of the current point and pick up a candidate for the next point. The candidate is evaluated on the basis of it satisfying a pre-defined tracking criterion for acceptance e.g., value and the direction gradient);*

concave comer, being a region of or a point on the contour having positive peaks of curvature *(see page 972, col.2, not only brightness information but also geometrical (curve, curvature, length, smoothness, etc) and even some global information about the boundary being detected and it is necessary to find a boundary in the feature space as well as its mapping onto the image surface as a single closed contour line);*

convex comer, being a region of or a point on the contour having negative peaks of curvature *(see page 972, col.2, not only brightness information but also geometrical (curve, curvature, length, smoothness etc) and even some global information about the boundary being detected and it is necessary to find a boundary in the feature space as well as its mapping onto the image surface as a single closed contour line)*;

straight segment, being segments of the contour having zero curvature *(see fig.3, gradient an optimal level and gradient on contour);* and/or circular segments, being segments of the contour having constant curvature *(see page 972, col.2, not only brightness information but also geometrical (curve, curvature, length, smoothness etc) and even some global information about the boundary being detected and it is necessary to find a boundary in the feature space as well as its mapping onto the image surface as a single closed contour line).*

Regarding claim 20, *Minsky discloses [claim examined as best understood by examiner],* a method of generating a database useful in connection with localizing and/or classifying a three dimensional object, said object being imaged so as to provide a two dimensional digital image of the object wherein the determination of primitives in the two dimensional digital image of the object (see *page 971, col.2, pixel classification and page 7972, col.1, lines 1-16)* comprises the steps of

generating the gradients of the digital image *(see page 972, col.1, lines 5-8, the detection of all the boundaries is equivalent to the detection of all homogeneous regions. Gradient methods can be classified into two categories, i.e. parallel and sequential edge detectors)*;

finding one or more local maxima of the absolute gradients (*both local minimum and local maximum gradient) (see pages 978-979, (a) local minimum , (b) location of optimal level line fig.3 and again examiner examined this claim limitation as best understood because applicant does not show how absolute gradients obtained any where in spec);*

use the one or more local maxima as seeds for generating contours (curves) *(see pages 978-979, (a) local minimum , (b) location of optimal level line fig.3 and again examiner examined this claim limitation as best understood because applicant does not show how absolute gradients obtained any where in spec),* the generation of the contours for each seed comprising determining an ordered list of points representing positions in the digital image and belonging to a contour *(see page 972, col.2, a curve following algorithm examines a neighborhood of current point and page 973, a surface, the description of a pixel location by vector z=(x,y) all these referred to contour order points),* for all of said positions determining the curvature, preferably determined as dθ/ds preferably pixel units, of the contours *(see page 972, col.1, given the initial point on a curve being tracked, a curve following algorithm examines a neighbourhood of the current point and pick up a candidate for the next point. The candidate is evaluated on the basis of it satisfying a pre-defined tracking criterion for acceptance e.g., value and the direction gradient)*;

from the determined curvatures determine primitives as characteristic points on or segments of the contours *(see page 972, col.1, given the initial point on a curve being tracked, a curve following algorithm examines a neighbourhood of the current point and*

pick up a candidate for the next point. The candidate is evaluated on the basis of it satisfying a pre-defined tracking criterion for acceptance e.g., value and the direction gradient) said method further comprising:

identifying features, being predefined sets of primitives, in a number of digital images of one or more object, the images represent different localizations of the one or more object *(see page 972, col.2, 12-15, the graph nodes were edge elements defined by two neighbouring pixels. A boundary was a sequence of adjacent edge elements that started and ended at pre-defined points, lines 25-47 extracting , finding a boundary in the feature space as well as its mapping onto the image surface as a single closed contour)*;

extracting and storing in the database, numerical descriptors of the features, said numerical descriptors being of the two kind (*see page 972, col.2, 12-15, the graph nodes were edge elements defined by two neighboring pixels. A boundary was a sequence of adjacent edge elements that started and ended at pre-defined points, lines 25-47 extracting, finding a boundary in the feature space as well as its mapping onto the image surface as a single closed contour)*:

extrinsic properties of the feature, that is the location and orientation of the feature in the image (*see page 973, col.2, an image surface and define a co-ordinate system O(x,y) for description of a pixel location by vector z=(x,y) and co-ordinate system referred to location and orientation feature of an image).*

Minsky does not disclose intrinsic properties of the feature being derived after a homographic transformation being applied to the feature.

However, Frank discloses intrinsic properties of the feature derived after a homographic transformation being applied to the feature matching said properties with those stored in the database *(see page 1486, col.1, the second and actual model relating the domain transformation between images presented is the homographic model and page 1487, col.2, the homographic transformation of (1) tonally by the comparametric relation of (3) to a good accuracy and page 1489, col.1, parameters are sets to the identify transformation, i.e., the range parameter k=1 and the domain model)* and in case a match is found assign the object corresponding to the properties matched in the database to be similar to the object of the object to be recognized *(see fig.2 and 3, compare sequence of images and compare referred to match).*

It would have been obvious to one having ordinary skill in the art when the invention was made to use Frank's intrinsic properties of the feature derived after a homographic transformation being applied to the feature matching said properties with those stored in the database in Frank's method for recognition, such as classification and/or localization of three dimensional objects, said one or more objects being imaged so as to provide a recognition image being a two dimensional digital image of the object, said method utilizes a database in which numerical descriptors are stored for a number of training images, the numerical descriptors are the intrinsic and extrinsic properties of a feature because it will to obtain accurate transformation between images such as translational, rotational, affine or homographic mapping, *[Frank, page 1485, col.1].*

Regarding claim 21, *Minsky discloses* a method according to claim 20 further comprising the step of eliminating potential seed points identified near already defined

contours *(see 972, col.1, lines 1-15, in this case, the classification task is restricted to the separation of all pixels into two classes only: contour and background (i.e. inner region) elements. In the segmentation task, such a decision is called the "formation of contour preparation").*

Regarding claim 22, *Minsky discloses* method according to claim 20, wherein the generation of the contours comprising assigning the list of points representing positions in the digital image, each point having a value being assigned to be common with the value of the seed *(see page 972, col.1, in this case, for any number of objects, the classification task is restricted to the separation of all pixels into two classes only: contour and background (i.e., inner region) elements. In the segmentation task, such a decision is called the formation of contour preparation).*

Regarding claim 23, *Minsky discloses* a method according to claim 20, wherein the generation of the contours comprising assigning the list of points following in each point the direction of the maximum or minimal gradient detected perpendicular to a contour direction *(see fig.3, gradient on inner lines of objects A and B and gradient on optimal level line and gradient on contour).*

Regarding claim 24, *Minsky discloses* a method according to claim 20, wherein the generation of the contours comprising assigning the list of points with values being above or below the value of the seed and one or more neighbour pixels with value below or above said value of the seed *(see 972, col.1, lines 1-15, in this case, the classification task is restricted to the separation of all pixels into two classes*

only: contour and background (i.e. inner region) elements. In the segmentation task, such a decision is called the "formation of contour preparation").

Regarding claim 25, *Minsky discloses* a method according to claim 20, wherein the list of pixels is established by moving through the digital image in a predetermined manner *(see page 972, col.2, the graph nodes were edge elements defined by two neighbouring pixels. A boundary was a sequence of adjacent edge elements that started and ended at pre-defined points).*

Regarding claim 26, *Minsky discloses* a method according to claim 21, wherein the contours being determined from an interpolation based on the list of pixels *See page 972, col.1, between two adjacent pixels I and j, the level of lines are located from V(zi) to V(zj)-1. It is assumed that V(zi) < V(j). If pixels i and j (on the conditions that the interpolation model of the image does not contain hills and valleys between pixels).*

Regarding claim 27, Minsky *discloses* a method according to claim 21, wherein the list is an ordered list of pixels *(see page 972, col.2, the graph nodes were edge elements defined by two neighbouring pixels. A boundary was a sequence of adjacent edge elements that started and ended at pre-defined points).*

Regarding claim 28, *Minsky discloses* a method according to claim 20, wherein the gradients are determined by calculating the difference between numerical values assigned to neighbouring pixels (*see page 972, col.1, the width of the pencil is also equal to the gradient brightness module if the distance between pixels is equal to one).*

Regarding claim 29*, Minsky discloses* a method according to claim 20, wherein the gradients are stored in an array in which each element corresponds to a specific position in the first image and being a numerical value representing the value of the gradient of the first image's tones in the specific position *(see page 1486, col.2, the comparametric relation between the pixel value of two image).*

Regarding claim 30*, Minsky discloses* a method according to claim 20, wherein the curvatures being established as x=dθ/ds where θ is the tangent direction at a point on a contour and s is the arc length measured from a reference point *(see page 972, col.2, not only brightness information but also geometrical (curve, curvature, length, smoothness etc) and even some global information about the boundary being detected and it is necessary to find a boundary in the feature space as well as its mapping onto the image surface as a single closed contour line).*

Regarding claim 31, *Minsky discloses* a method according to claim 20, wherein the primitives comprise of one or more of the following characteristics:

segments of straight lines, segments of relatively large radius circles, inflection points, points of maximum numerical value of the curvature, said points being preferably assigned to be comers, points separating portions of very low and very high numerical value of the curvature, and small area entities enclosed by a contour (*see page 972, col.2, not only brightness information but also geometrical (curve, curvature, length, smoothness etc) and even some global information about the boundary being detected and it is necessary to find a boundary in the feature space as well as its mapping onto the image surface as a single closed contour line).*

Regarding claim 32, *Minsky discloses* a method according to claim 20, wherein each contour is searched for one or more of the following primitives:

inflection point, being a region of or a point on the contour having values of the absolute value of the curvature being higher than a predefined level *(see page 972, col.1, given the initial point on a curve being tracked, a curve following algorithm examines a neighbourhood of the current point and pick up a candidate for the next point. The candidate is evaluated on the basis of it satisfying a pre-defined tracking criterion for acceptance e.g., value and the direction gradient*);

concave comer, being a region of or a point on the contour having positive peaks of curvature *(see page 972, col.2, not only brightness information but also geometrical (curve, curvature, length, smoothness, etc) and even some global information about the boundary being detected and it is necessary to find a boundary in the feature space as well as its mapping onto the image surface as a single closed contour line)*;

convex comer, being a region of or a point on the contour having negative peaks of curvature *(see page 972, col.2, not only brightness information but also geometrical (curve, curvature, length, smoothness etc) and even some global information about the boundary being detected and it is necessary to find a boundary in the feature space as well as its mapping onto the image surface as a single closed contour line);*

straight segment, being segments of the contour having zero curvature *(see fig.3, gradient an optimal level and gradient on contour);*

and/or circular segments, being segments of the contour having constant curvature

(see page 972, col.2, not only brightness information but also geometrical (curve, curvature, length, smoothness etc) and even some global information about the boundary being detected and it is necessary to find a boundary in the feature space as well as its mapping onto the image surface as a single closed contour line).

Regarding claim 33, *Minsky discloses* a method according to claim 1, wherein the extrinsic properties comprises a reference point and a reference direction *(see page 973, col.2, an image surface and define a co-ordinate system O(x,y) for description of a pixel location by vector z=(x,y) and co-ordinate system referred to location and orientation feature of an image).*

Regarding claim 34, *Frank discloses* a method according to claim 1, wherein the intrinsic properties comprises numerical quantities of features *(see page 1486, col.1, the second and actual model relating the domain transformation between images presented is the homographic model and page 1487, col.2, the homographic transformation of (1) tonally by the comparametric relation of (3) to a good accuracy and page 1489, col.1, parameters are sets to the identify transformation, i.e., the range parameter k=1).*

Regarding claim 35, *Frank discloses* a method according to claim 1, wherein the object being imaged by at least two imaging devices thereby generating at least two recognition images of the object and wherein the method according to claim applied to each recognition image and wherein the match found for each recognition image are compared *(see figs.2 and 3, compare sequence of images and compare referred to match).*

Regarding claim 36, Frank *discloses* a method according to claim 35, where the method comprising the steps of:

for each imaging device, providing an estimate for the three dimensional reference point of the object *(see page 1486, col.1, this model is known to describe the relation between perspective views captured by a pinhole camera that is allowed to pan, tilt, rotate and and/or zoom about its optical and col.2, now, under the ideal and noiseless pinhole camera model, and 3-D point imaged under the constrained camera motion previously described would appear as having the same pixel value in any of the images captured in which it was constrained),*

for each imaging device, calculating a line from the imaging device pinhole to the estimated reference point, and when at least two or more lines have been provided *(see page 1486, col.2, for estimating the fixed camera parameters),*

discarding the estimates in the case that the said two or more lines do not essentially intersect in three dimensions (*see page 1490, to correct for this misalignment, we use these pair-wise estimate to initialize the simultaneous registration procedure and fig.3),*

and when the said two or more lines essentially intersect, estimating a global position of the reference point based on the pseudo intersection between the lines obtained from each imaging device *(see page 1490, to correct for this misalignment, we use these pair-wise estimate to initialize the simultaneous registration procedure and fig.3).*

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to AKLILU k. WOLDEMARIAM whose telephone number is (571)270-3247. The examiner can normally be reached on Monday-Thursday 6:30 a.m-5:00 p.m EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bali Vikkram can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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